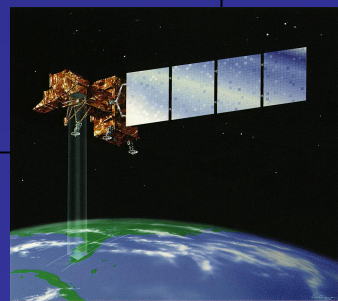
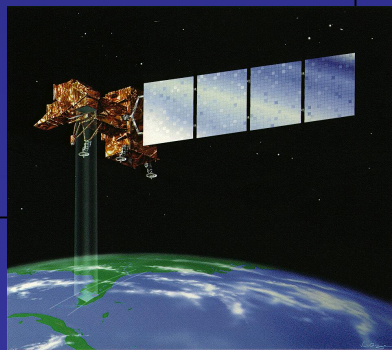
Landsat Education and Public Outreach (EPO) 2007

- Anita Davis (lead at GSFC; informal education)
- Jeannie Allen (formal education)
- Laura Rocchio (web; writing; training; image processing; graphics for Queens)
- Frank Niepold (occasional guest teacher)
- USGS Partners (Ron Beck, Rachel Kurtz)



Landsat EPO Approach

- Formal Education
- Informal Education
- Outreach (news, community day, peer communications, HQ requests, etc.)
- Collaborations and Partnerships
- Opportunistic (ROSES Ed. Supplements)
- Strategically work at hubs (not spokes!)



What's the ***Big Idea***?

Landsat/LDCM provides a unique and critical (essential? useful? valuable?) contribution to humanity's understanding of our home planet.

- **Continuity of data over 35+ years**
- **Global data set (annually)**
- **High quality of data (even higher with LDCM)**
- **Spatial scale commensurate with human intervention/activity/impact**

Who's the *Audience*?

General Public

Formal Educators

Informal Educators

Journalists/Media

Resource Managers

Other Professionals (science peers, data users)

Policy Makers

Internal NASA

What are the best ***Opportunities*** to reach each audience?

- Classroom
- Internet
- News media/PAO
- Short Courses
- Distance Learning
- Radio Shows
- Pod casts
- TV Shows
- Parks/Nature Centers
- Science Cafés
- Museums/Science Centers
- Libraries
- After school programming
- Conferences/ Pro Dev Workshops
- Youth Groups (4-H, GSA, BSA,etc)
- Events *(Earth Day, RS of Earth Day etc.)*

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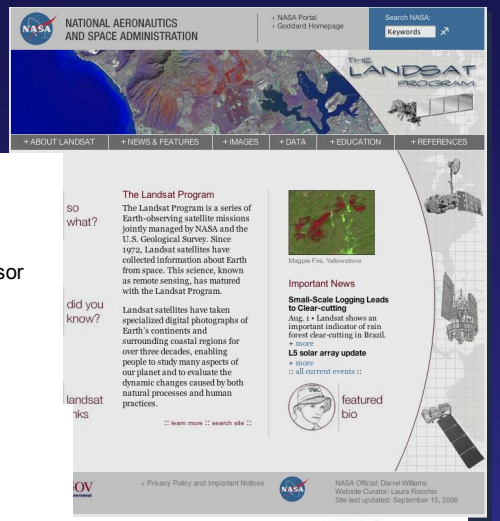

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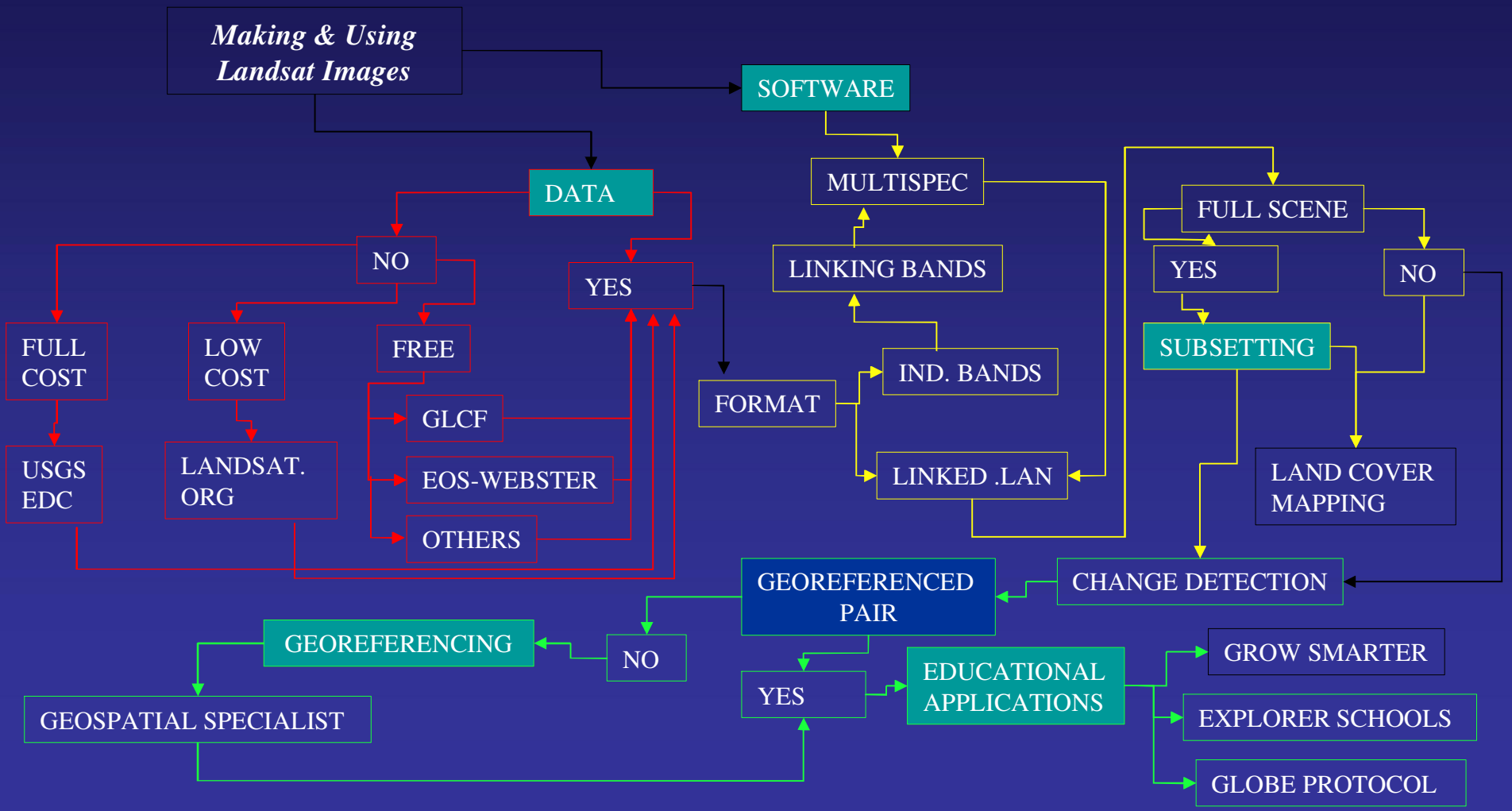
QuickTime™ and a TIFF (Uncompressed) decompressor are needed to see this picture.

QuickTime™ and a TIFF (Uncompressed) decompressor are needed to see this picture.

What are the best *Techniques* to reach each audience?

- Printed Publications
  - *Posters*
  - *Flyers*
  - *Brochures*
- Canned presentations
- Visualizations
- Image Gallery
- Classroom Activities
- Exhibits
- Audio spots
- Games
- Informal Ed Activities
- Electronic Field Trip
- Blog
- WebCam
- DLN/other distance learning
- WebCast

Getting Data into the Hands of Educators is Challenging!



Change Detection Web Site

Supports Numerous Efforts

Explorer Schools
GLOBE Schools
Interested Schools
National Park efforts, etc

http://change.gsfc.nasa.gov

Formal Education Projects

- Geospatial Workforce Development at Two-year Colleges
- Delaware River Basin
- Salish-Kootenai Tribal College Interns
- Classroom Activities (ex., *Quantifying Change*)
- Teacher workshop training materials

Integrated Geospatial Education and Technology Training (iGETT)

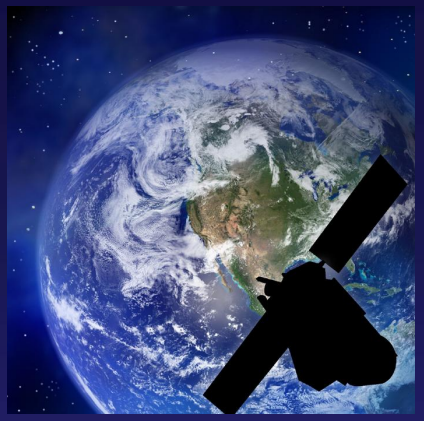
NSF - Funded 3-year Professional Development program (2007-2010)
Partner with 40 GIS faculty at 20 Two-Year Colleges

Produce and Disseminate:

- faculty learning program
  - replicated using resources on the iGETT Web site
  - and iGETT-recommended on-line courses
- model instructional programs
  - two-year geospatial technologist education
  - short-term training for working professionals

http://ncge.org/publications/gew

iGETT participants will receive training, mentoring, and financial support to --

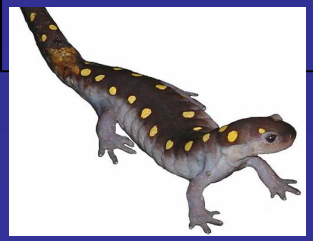


- ♣ participate in two consecutive summer institutes at Delmar College in Christi, TX to learn remote sensing, GIS, and other geospatial technologies; workforce applications; and program development
- ♣ develop their own strategic plans to meet the specific needs of their institutions and communities
- ♣ receive further enrichment, mentoring, and communications during the academic years
- ♣ enhance/develop courses, course modules, and programs that integrate remote sensing, GPS, GIS, and other technologies
- ♣ participate in a final meeting in association with a major national conference or conduct regional seminars of their own.

iGETT staff: *iGETT is managed through an interagency partnership of the National Council for Geographic Education (NCGE), Environmental Systems Research Institute (ESRI); Del Mar College; Science Systems and Applications, Inc. (SSAI) at the National Aeronautics and Space Administration (NASA) Goddard Space Flight Center; and the U.S. Geological Survey (USGS) Land Remote Sensing Program.*

Delaware River Basin

- Upper Delaware Scenic & Recreational River
- Delaware Water Gap National Recreation Area
- PA, NY, NJ education systems
- Wallenpaupack Middle & High Schools
- GLOBE model for students
- New Investigator Grant Funded



Tribal College Internships

- Three interns per summer
- Supported through Headquarters Minority Office, Goddard University Affairs, and LDCM funds
- One-on-one mentor relationships
- Tailored to meet unique needs of tribal students
- Interns moving forward in careers

Observing Land Cover Changes from 1989 to 2000 in Shiprock, New Mexico

Vegetation Coverage on Ft. Defiance Agency

Potential Fire Threats to Sacred Sites and Materials of the Blackfeet Nation

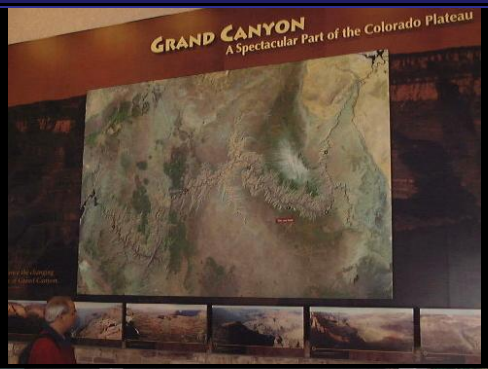
Informal Education Projects

- NASA Explorer Institute, *Earth to Sky NASA-NPS Partnership*
- International Polar Year Landsat Image Mosaic of Antarctica (LIMA) Website
- NPS Views Website Modules
- *Earth from Space* Smithsonian Institution Traveling Exhibit (USGS)
- Science Cafes? (coming to a pub near you!)

Earth to Sky: An Innovative Partnership

http://www.earthtosky.org

Actively fostering collaborative work between the science and interpretation/education communities of NPS and NASA. Ultimately enriching the experiences of millions of park visitors.



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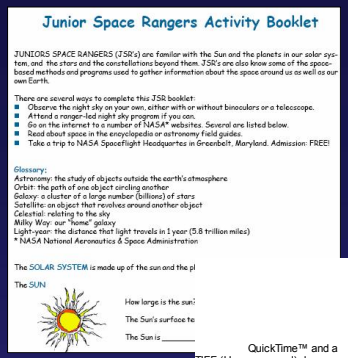
Millions of Visitors are Learning about NASA Science at Parks throughout the Nation



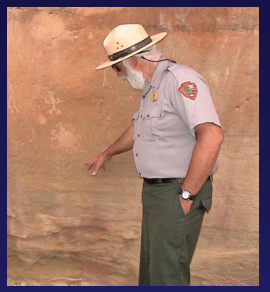
QuickTime™ and a TIFF (Uncompressed) decompressor are needed to see this picture.

Jr. Space Ranger Activities and Badge
Delaware Water Gap

Climate Change in Parks
brochure, tutorial, and display for use nation-wide

Never Summer, Ever Summer
Rocky Mountain National Park
Interpretive Program

Life/Water Connections on Earth and Mars, K-12 Curriculum
Amistad National Recreation Area



QuickTime™ and a TIFF (Uncompressed) decompressor are needed to see this picture.

Night Watch/Sky Watch: The Universe Through the Lens of Science and the Native American Perspective
Canyon de Chelly

***Faces of Antarctica*: Education and Outreach during the International Polar Year using the new Landsat Image Mosaic of Antarctica**

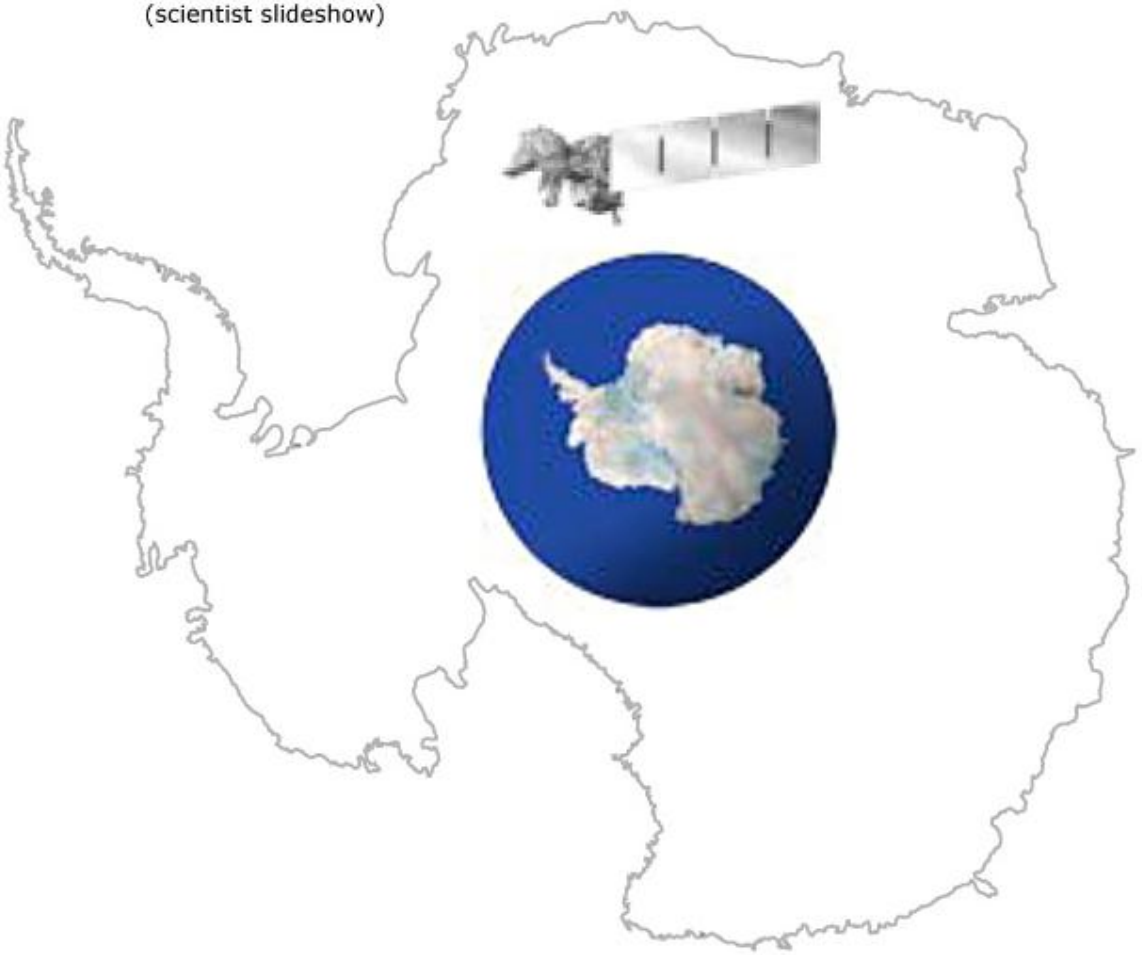
Principal Investigator:
Robert Bindschadler (NASA)

Co-Investigators:
Adrian Fox (British Antarctic Survey)
Robert Ridky (USGS)
Goran Halusa (SSAI)
Brian Campbell (SAIC)
Anita Davis (SSAI)
Jessica Robin (SSAI)
Kevin Ward (SSAI)

LIMA Landsat Image Mosaic of Antarctica

Scrolling Banner of Questions

(scientist slideshow)



- Antarctic Mysteries
- Polar People
- Let's Go to School!
  - For Students
  - For Teachers
- Get Data Here
  - How Data are Collected
- IPY Locator:
  What Else is Going On?
- Library:
  A Gallery of Animations, Graphics, and Movies

Responsible NASA Official: Robert Bindschadler
Webmaster: Goran N. Halusa
Last Updated: December 19, 2006

LIMA Landsat Image Mosaic of Antarctica

For Teachers

Antarctic Mysteries • Polar People • Let's Go to School! • Get Data Here • IPY Locator • Library

Antarctic Mysteries

Questions

Question 1 Title
A brief teaser can go here

Question 2 Title
A brief teaser can go here

Question 3 Title
A brief teaser can go here

Question 4 Title
A brief teaser can go here

Introduction

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Links

Press Releases
Release 1
Release 2
Release 3
Release 4

Popular Articles
Article 1
Article 2
Article 3
Article 4

Responsible NASA Official: Robert Bindschadler
Webmaster: Goran N. Halusa
Last Updated: December 15, 2006

LIMA Landsat Image Mosaic of Antarctica

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Polar People

People

Ernest H. Shackleton
A brief teaser can go here

Person Two
A brief teaser can go here

Person Three
A brief teaser can go here

Person Four
A brief teaser can go here

Ernest H. Shackleton

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Explore!

Exploration Excersise

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Get Data Here

Links

USGS Data
A brief teaser can go here

NEO: NASA Earth Observations
A brief teaser can go here

Google Earth
A brief teaser can go here

Introduction

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How the Data Are Collected

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More Information

Responsible NASA Official: Robert Bindschadler
Webmaster: Goran N. Halusa
Last Updated: December 15, 2006

LIMA Landsat Image Mosaic of Antarctica

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IPY Locator: What Else is Going On?

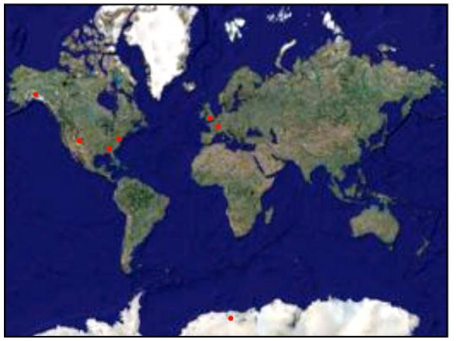
Links

Link One
A brief teaser can go here

Link Two
A brief teaser can go here

Link Three
A brief teaser can go here

Interactive Map



Antarctic Gazetteer

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Link to Gazetteer

Responsible NASA Official: Robert Bindschadler
Webmaster: Goran N. Halusa
Last Updated: December 15, 2006

National Park Service Views Website

- Knowledge Center
- Virtual Experiences

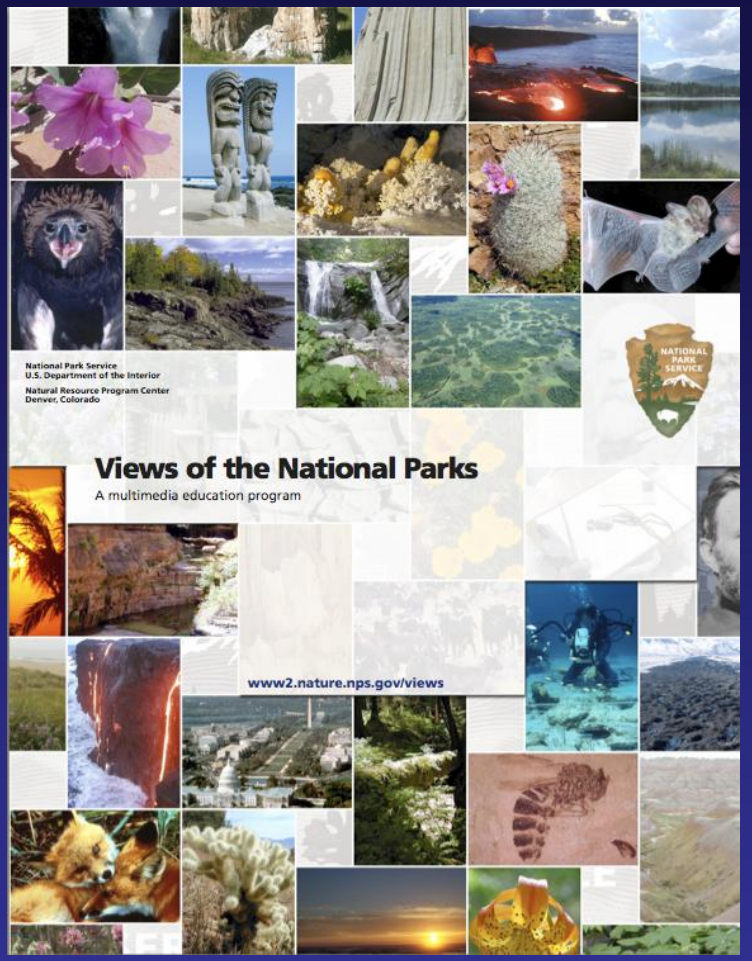
Bring National Parks into Classrooms

Make Connections to Americans

Inspire people to visit parks

American Geological Institute
16,000 Earth Science Week packets 2006

Geological Society of America,
George Wright Society Conferences



Grand Canyon; Chesapeake Bay;
Comparative Planetology

www2.nature.nps.gov/views

Beer, Wings, and Cutting-Edge Research: Reaching New Audiences with *Science Cafes!*

- Short presentation by a scientist
- Focus on creating a conversation actively involving everyone present
- Most meet in casual public venues, such as pubs and coffeehouses, where people are accustomed to meeting with friends
- Emphasis on conversation in a comfortable space (effectively engage people that do not consider themselves science enthusiasts)

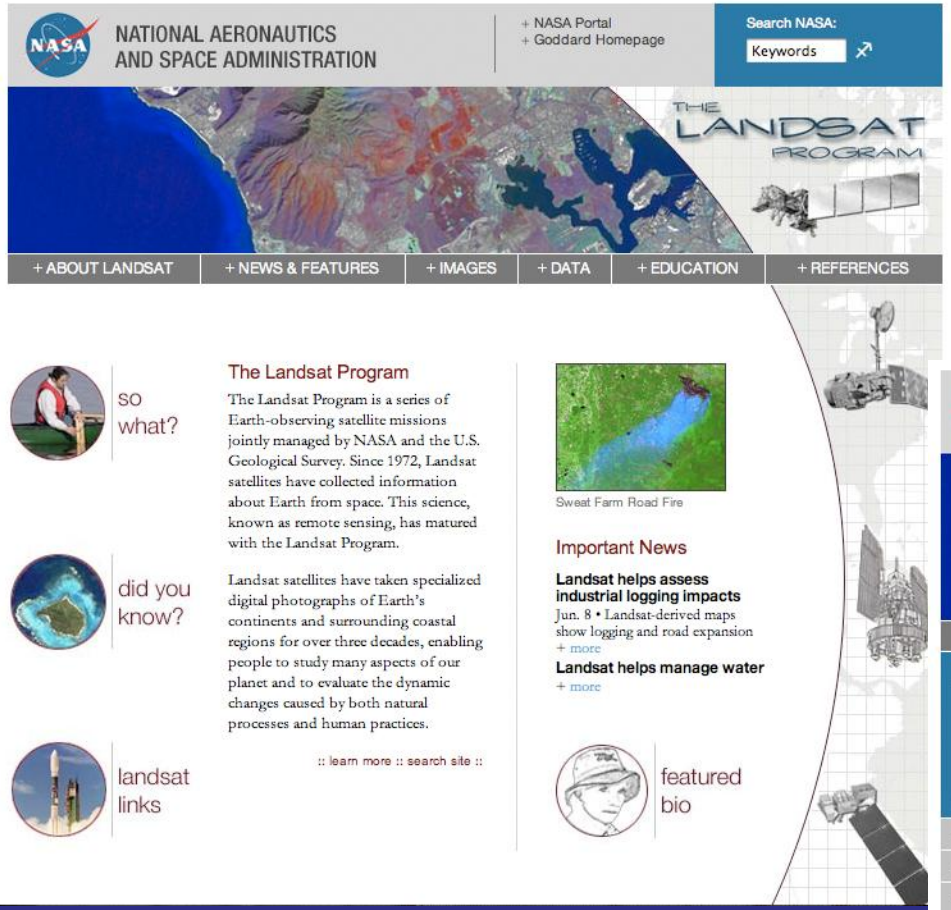
Some science cafes have shown that the format can make scientific research relevant enough to occupy the same cultural space as popular forms of entertainment, such as live music and sporting events.

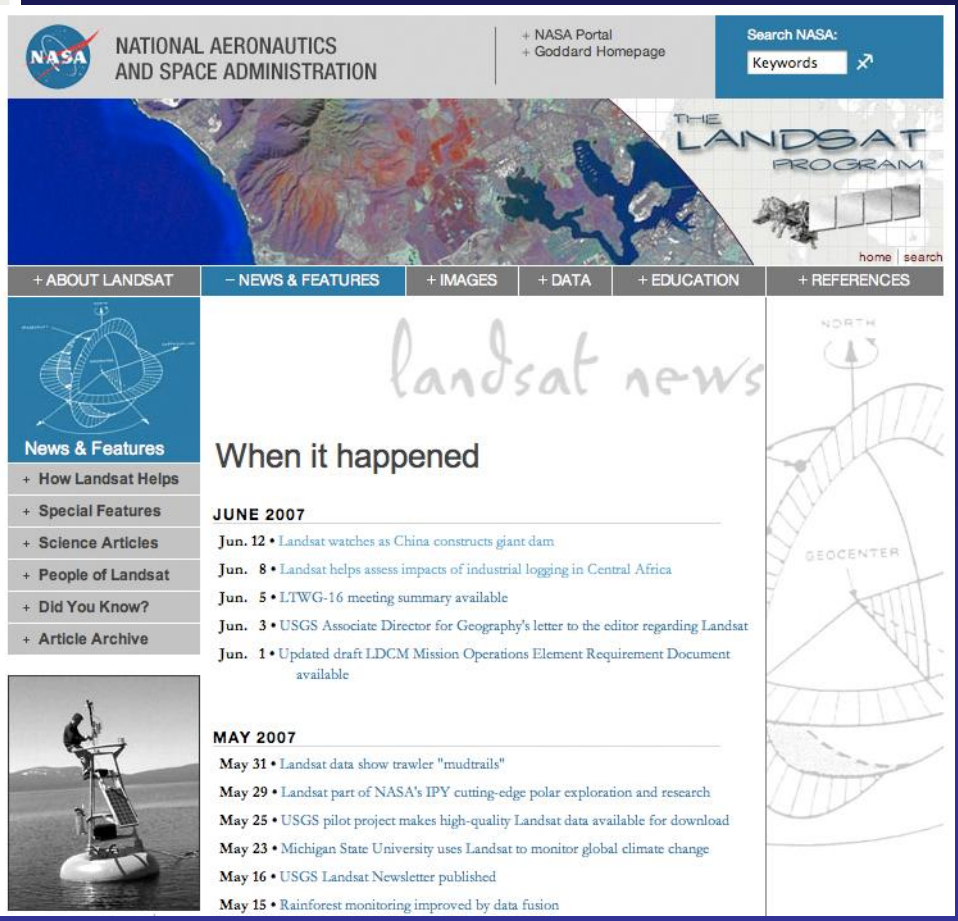
Ben Wiehe
Outreach Coordinator for the WGBH Educational Foundation, a leading producer of content for the PBS and NPR systems

http://www.pbs.org/wgbh/nova/sciencenow/

Outreach Projects

- Brochures/handouts
- Conference attendance/support
- Support for HQ requests
- Peer communications (NARSEC; GWS; etc.)
- Web site; Change Detection; tutorials





Landsat Program Web Site

landsat.gsfc.nasa.gov

90 news briefs, 31 feature articles

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

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Landsat Helps Assess Impacts of Industrial Logging in Central Africa

Source: Elizabeth Braun, Woods Hole Research Center
Posted:
Jun. 8, 2007

Though the dense humid forests of Central Africa have been regarded as among the most pristine on Earth, the expansion of industrial logging and the accompanying proliferation of road density are threatening the future of this important ecosystem. Woods Hole Research Center scientists are using [Landsat] satellite imagery taken from 1976 to 2003 to study the development of industrial logging and road density in Central Africa so that scientists, conservation agencies and other organizations can better understand the trends and implications of such expansion. The work is profiled in the current issue of Science.

Road constructed through swamp forest to reach the Loudougou concession in Northern Congo. Photo credit: Nadine Laporte.

According to Nadine Laporte, an associate scientist at the Woods Hole Research

Feature articles

Scientific Publications

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References

– Recent Publications
+ Glossary
+ Data Users Guide
+ Documents
+ Landsat Legacy

Recent Publications

2007

Laporte, N., J.A. Stabach, R. Grosch, T.S. Lin, and S.J. Goetz, "Expansion of Industrial Logging in Central Africa," *Science*, vol. 316, 8 June 2007, p: 1451. [external link]

2006

Arvidson, T., S.N. Goward, D.L. Williams, and J. Gasch (2006). **Landsat-7 long-term acquisition plan: Development and validation**, *Photogrammetric Engineering & Remote Sensing*, vol. 72, no. 10, pp: 1137–1146. [Abstract | Popular summary]

Goward, S.N., T.J. Arvidson, J. Faundeen, D.L. Williams, J. Irons, and S. Franks (2006). **Historical record of Landsat global coverage: Mission operations, NSLRSDA, and international cooperator stations**, *Photogrammetric Engineering & Remote Sensing*, vol. 72, no. 10, pp: 1155–1169. [Abstract]

Green, K. (2006). **Landsat in context: The land remote sensing business model**, *Photogrammetric Engineering & Remote Sensing*, vol. 72, no. 10, pp: 1147–1153. [Abstract]

Irish, R.R., J.L. Barker, S.N. Goward, and T.J. Arvidson (2006). **Characterization of the Landsat-7 EMT automated cloud-cover assessment (ACCA) algorithm**, *Photogrammetric Engineering & Remote Sensing*, vol. 72, no. 10, pp: 1179–1188. [Abstract | Popular summary]

Irons, J. and J. Masek (2006). **Requirements for a Landsat Data Continuity Mission**, *Photogrammetric Engineering & Remote Sensing*, vol. 72, no. 10, pp: 1102–1108. [Abstract | Popular summary]

About Landsat
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+ Landsat & People
+ Technical Details
+ Science
– Applications
+ LDCM

Determining range readiness, biomass and health

Contributor:
Curtis E. Woodcock, Boston University

Fire, drought, and humans all can destroy forests and their ecosystems. While much attention is paid to deforestation in tropical rainforests, very few comprehensive studies have been done to address changes in the Earth's temperate conifer forests. Temperate conifer forests lie at latitudes above tropical forests and below boreal forests and account for much of the forested area in the United States and Europe.

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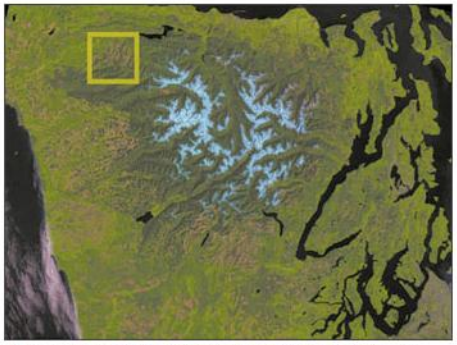
Understanding changes occurring in temperate conifer forests is important for understanding environmental issues including wildlife habitat protection, watershed management, timber harvest, and understanding the role of human activities on changes in regional climates.



Using Landsat images of Washington's Olympic Peninsula like the one above, Boston University researchers can keep track of what areas are being cut, and what areas of forest are regrowing. The square box in this 1986

Previously, researchers have only been able to monitor changes in specific locations with Landsat data due to its limited availability. Boston University geographer Curtis E. Woodcock and colleagues used Landsat to monitor how drought in the late 1980s and early 1990s affected forests in California's Sierra Nevada. During the drought, Woodcock found that Landsat images could recognize areas where trees were dying due to lack of

News & Features
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+ Special Features
+ Science Articles
+ People of Landsat
+ Did You Know?
+ Article Archive

Precious Resources: Water & Landsat's Thermal Band

Contributor: Laura Rocchio
Posted:
April 17, 2007

"Chronic water supply problems in many areas of the West are among the greatest challenges we face in the coming decades." Mark Limbaugh, the U.S. Department of the Interior's (DOI) Assistant Secretary for Water and Science, told U.S. Senators in 2006.

He was largely echoing the findings of the DOI *Water 2025* report. The report explains that if future conflict over water in the West is to be avoided, water efficiency needs to improve. Until then, conflict and environmental degradation will be the costs of the increasing demands—dominated by agricultural irrigation and swelling city populations—on limited water supplies.

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Irrigation: a numerical explanation

Irrigation accounts for 80% of fresh water use in the U.S and worldwide, the World Bank estimates 70% of fresh water use is for agriculture. The U.S. irrigates over 50 million acres of agricultural land and 32 million acres of recreational landscapes (lawns, golf courses, etc.). The total volume consumed by agriculture and landscape irrigation is 50 trillion gallons per year; western states are responsible for 86% of that consumption.

Irrigation system in Colorado. Photo credit: USDA

A growing problem

The arid U.S. West is experiencing explosive population

Landsat and Landsat Data Continuity Mission

Education and Public Outreach

Anita Davis, SSAI
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Laura Rocchio
Lrocchio@ltpmail.gsfc.nasa.gov

http://landsat.gsfc.nasa.gov/education.html

http://ldcm.gsfc.nasa.gov